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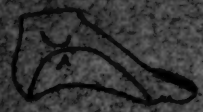

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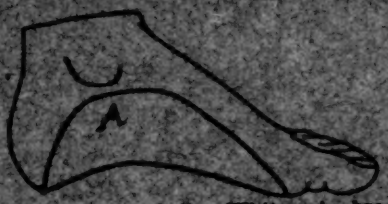

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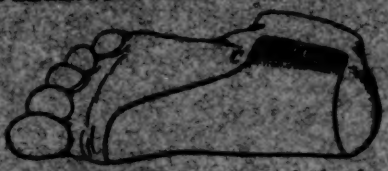

Shows the under surface of the brace and the outer flange. B—The calcaneo-cuboid articulation. C—The extremity of the fifth metatarsal bone.

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The Journal *of* Orthopædic Surgery

THE SUPPLY OF ARTIFICIAL LIMBS TO WAR AMPUTEES IN ENGLAND

BY E. MUIRHEAD LITTLE, F. R. C. S. LONDON

The three years which have passed since the publication in the American Journal of Orthopaedic Surgery in April 1918 of the writer's paper on Amputation Stumps have not caused him to modify the opinions then expressed to any great extent. The following remarks however embody the results of this further experience. The return of former patients for repairs to their limbs etc., has afforded opportunity of judging to what degree the provision of end-bearing pads in artificial legs had proved satisfactory.

It may be remembered that in the paper above referred to it was stated that it had been thought advisable to prescribe such pads for fifty per cent of the lower limb amputees. As it appears obvious that it was desirable whenever possible to use the end of the stump for purposes of support, so relieving the circumference and upper parts of it, a number of cases were ordered end-bearing some of which were only questionably suited to it. As the sling and pad were simple additions to the limb, no harm would be done if the patient found it uncomfortable or painful, as he could easily remove the pad himself.

In March 1920 220 consecutive cases to which end-bearings had been supplied were examined on their return for repairs or for duplicate limbs.

Of these 124 were above knee amputations.

Of these 8 were through the knee joint.

Of these 88 were below the knee.

Of the 124 above knee cases 84 or 67% were using the pad. Of the 8 through knee cases all, or 100%,* and of the 88 below knee cases 68 and 77% were so doing. Of the 220 cases taken together 160 or 72.7% were using the end-bearing.

Thus as 50% of all cases were ordered it, it may be taken as established that about 34% of all above knee cases will be found to be able to use end-bearings.

Another point which has come out is the occurrence of nerve pains in stumps after prostheses have been worn without pain for a year or more. These appear to be due to atrophy of the soft parts, owing to which nerve trunks which were before affected, may become exposed to the pressure of the socket and give such trouble that resection and alcoholic injection of the nerves become necessary.

The Ministry of Pensions is responsible among other things for the supply and upkeep of artificial limbs and appliances to pensioners. Neither the Ministry nor the Commissioners of the Royal Hospital at Chelsea, on whom this responsibility formerly lay have thought fit to manufacture artificial limbs.

The productions of a number of firms of limb-makers have been inspected and when found satisfactory have been approved and surgeons in charge of limb-fitting hospitals and centres are at liberty to order of any of these approved limbs. But the official list of limbs thus approved included many different types, from the old dummy artificial arm and the "Clapper" or "Railway" leg (so called because it has been made by certain Railway Companies for supply to their employees) to the Carnes or McKay arm, and the lighter modern artificial wooden leg with knee control. This variety of types and quality was the result of the demand outrunning the supply so that limbs were approved which perhaps might have been rejected had the need for limbs been less urgent. It has been decided that every amputee shall have two artifical limbs for each stump and these shall be repaired and replaced when necessary as long as he lives. A large number of second or duplcate limbs have already been supplied, and the return of these pensioners for fitting has enabled limb fitting surgeons to form some opinions as to the usefulness of the first issues.

*It must not be assumed that every case of amputation through the knee joint was fit for end-bearing. It simply means that in the 8 cases noted our prognosis was correct.

As regards leg protheses, the Ministry has since the Armistice, on the advice of surgeons and limb-makers, decided on a number of standard types of limbs, which the members of the British Limb-makers Association have undertaken to manufacture and supply; metal parts of standard patterns being furnished by the Ministry. It is hoped that 'ere long all new limbs will be of one standard pattern for each kind of amputation. Maenwhile however, there are all sorts of limbs in use, which from time to time need repair and replacement and the surgeon to a limb-fitting hospital is confronted with the problem of how to satisfy the desires of the pensioners and at the same time to see that each man has adequate appliances.

In the issue of the first limbs to amputees the wishes of the patient could seldom be any help to the surgeon, because the former had no experience of protheses and could seldom tell what was good for him. The responsibility of selection therefore rested almost entirely upon the surgeon.

But now the case is altered. It is recognized that the man who has not merely been in possession of but has regularly worn a certain type of limb is generally a good judge as to whether it suits him or no, and that he has the right of choice of a new one. As regards artificial legs, experience teaches us that:

There is no artificial limb so old fashioned, and apparently inadequate, but that some amputees will swear *by* it and will take no other for a second issue.

There is no artificial limb so well designed, constructed and fitted, but that some amputees will swear *at* it and say that they "would not be seen dead with it!"

Arm prostheses are neither so necessary nor so useful as those for the lower extremity. The functions of the upper extremity are far more delicate and complicated and require a much higher degree of co-ordination of muscles and nerves than do those of the leg. Consequently it is possible to approach more nearly the ideal of a true and complete substitute in the latter than in the former case. The foot of boot-wearing man has ceased to be used as a prehensile organ and the functions of the lower extremity are confined to locomotion and the maintenance of the erect position. The leg amputee who has no prosthesis, cannot move easily from place to place except with the help of crutches and for him there-

fore a prosthesis is a necessity. On the other hand, those who have lost one arm in many walks of life can do as well with one sound hand as with two, and a number of them have declared, after they have adapted themselves to a one armed existence, that they hardly knew what they wanted with two hands formerly.

Those who have had the misfortune to lose both hands are in a different category altogether. Thus, while it is more difficult to make good the loss of one hand or arm than that of a leg it is fortunately less necessary to do so. To the labourer however and to the handicraftsmen whose work is bimanual a prosthesis is necessary and the more simple the efforts required, the more useful will it be. The agricultural labourer may be capable, with a comparatively simple prosthesis, of doing a good hard day's work, equal in some cases to what he could do before his disablement. In France where so large a proportion of the population works on the land, it has been found that such occupation is best suited to the arm-amputee.

The most important factor however, in the estimation of the value of an arm stump or stumps is the character of the patient himself. Those who have pluck and perseverance: in short are so fortunate as to be endowed with the will to make good, will succeed in the use of almost any prosthesis and the better that prosthesis is, the better will their work be. There are others who are easily disheartened after a short trial, or who will not try at all.

It is unfortunately true that a large number of amputees who were provided with arms by the Government did not wear them. An enquiry made by the Ministry of Pensions in 1918 elicited the information that out of 1746 men amputated above the elbow only 20% used their prostheses in their occupations and that out of 737 amputated below the elbow 48.5% so used them. 57% of the above elbow cases and 30% or the below elbow cases however, were engaged in occupations which did not require the use of two hands.

As many of the arms concerned were of old patterns, a second and more detailed enquiry was made in 1919 into the usefulness of 1354 arms issued in 1917. This enquiry elicited a rather more encouraging report. It is to be noted that of the total number there were more left (717) than right (637) arms. The

enquiry cannot however be considered complete, as a considerable number of those circularized did not reply.

The institution since this enquiry of systematic training of all arm amputees in the use of their prostheses at limb fitting hospitals and the improvements in the design and manufacture of arms, will it is to be hoped, result in greatly increased usefulness of arm prostheses among the wounded of the great war. These statistics confirm the conclusion to which most observers had already come, that the problem of the provision of above elbow prostheses is distinct from and more difficult of solution than that of the below elbow.

The plight of the man who has lost both hands is distressing, even if he labours under no other disabilities and if he have two long forearm stumps. With such stumps it is surprising how much a man can do for himself without prostheses, for by bringing them together he combines them into a prehensile organ or rudimentary hand, which has the great advantage over a prosthesis of possessing tactile sensation, which becomes more delicate with prolonged use. With the loss of each inch of bone in one or other stump the disability increases, until the lowest depth of deprivation is reached in the man who has lost both arms at the shoulder joint or a few inches below it. These unfortunates are happily few in number, but their case needs as much consideration as that of the more frequent amputations. A remarkable facility in writing with a pen or pencil held in the teeth may be developed, many other light tasks may be performed by means of a stick generally held in the mouth but the best hope for them lies in the utilization of the feet when these are uninjured. Whether mobility and prehensile power in the toes could be developed by giving up the constant use of shoes and stockings is yet to be demonstrated, but the remarkable usefulness of the feet to those who have been born without hands suggests the propriety of further study in this connection. In 1916 Mr. C. A. Sheehan invented a table fitted with levers to be worked by the feet for these cases[1] and Mr. George Thomson of Edinburgh has since devised a most ingenious machine on somewhat similar principles which enables the truly armless man to do a variety of things.[2]

[1]See British Medical Journal 5-5-17 p. 583.

[2]See British Medical Journal 3-1-20 p. 20.

This machine however is stationary and the patient is nearly helpless when he leaves it. Attempts have been made to design a prosthesis of which the motive force is supplied by movements of the thigh and leg, but up to the present time (1921) they have not resulted in anything of much practical value.

Not only in these extreme cases but in all those of loss of both forearms or of more, the patient is unable to dress himself or to attend to the common needs of daily life or the calls of nature and must depend upon the constant service of an attendant or relative. Even a cold in the head is a severe increase to his troubles, so that it may be found best for him to keep his bed during an attack of catarrh.

In the case of all arm-prostheses, the design and details of manufacture present the greatest difficulties and are more important than the fitting of the socket to the stump.

In leg prostheses on the contrary the converse obtains. Fit is more important and more difficult than design and manufacture of the parts other than the socket.

Indeed, it may be said that the crudest and worst type of artificial leg with a well fitting socket and well aligned and balanced is better than the best and most elaborate type, if ill fitted and badly aligned and balanced.

A very large number of artificial arms, both ornamental and "workers" of various makes have been supplied. By the latter term is meant an arm which scarcely pretends to resemble the natural limb, except that an artificial hand can be worn on it, but that is intended primarily as a working mechanism for the use of a hook or special appliance.

The pensioners who have returned to Hospital during the last year or two in order to have repairs and readjustments made, or for the supply of duplicate limbs appear to have found all sorts of things useful, according to their occupations, but many of the above elbow amputees complained of the weight of the arms and chose a new light but strong ornamental prosthesis which weighs with a wooden hand and equipment under two pounds. The stump sockets and the forearm parts of these arms are made of "Certus" glue and a woven fabric and are very strong and light. Duralumin is largely used for the metal parts.

NOTE—For a description of Duralumin and its uses in Orthopaedic appliances see the author's lecture on "a New Material for Surgical Appliances." British Medical Journal. 3-2-12. Page 236.

Such arms are supplied as ornaments on "Dress Arms" but they are strong enough for light work. The elbow is flexed and locked by shoulder and chest action and the hand can be detached and a hook or other appliance substituted. Despite their lightness these arms are stronger than the old pre-war ornamental arm and hand without any elbow control.

The earlier working arms for shoulder amputations, made without any joint at the shoulder have been abandoned, and two types having artificial shoulder joints and elbow control have been substituted. One of these is a strong working prosthesis of stiff leather and steel, useful for heavy labour. The other is made of glue and fabric and duralumin and is an ornamental or "dress" arm. Many pensioners are now fitted with one of each type. The working arms of stiff leather and steel which were supplied for short upper arm stumps—two or three inches long, measuring from the anterior axillary fold, which had a steel artificial shoulder joint have not proved successful. Many of these were issued but few have been worn, or if worn have proved useful. The short stump has proved unequal to the task of moving the prosthesis and the limb is laid aside on account of the fatigue caused by the attempt.

It is evident that very few men use an artificial hand in their work. A limited number of those of the "white collar" class, clerks, commercial travelers, messengers, etc., have found the Carnes hand and arm advantageous to them despite the fact that appliances cannot be substituted for the hand. Another type with a fixed hand is the Pringle-Kirk arm, which has a hand, the fingers of which are made of steel spiral springs backed with stiff leather. These fingers and the thumb can be closed on any object by working a lever situated at the wrist with the sound hand. This lever acts on the fingers by an ingenious ratchet movement.

Although this method appears clumsy, the hand has proved useful for hard work and those who wear it report favourably of it. Such an arrangement has the drawback that the grasp cannot be relaxed instantaneously, which in an emergency may be necessary. The power of quickly detaching an artificial hand or appliance is of great value and on it a man's life may depend when he has to deal with machinery, horses, etc. For this reason among others the screw attachment of hands and hooks, etc., to the wrist

has been given up in favour of a spring catch snap, which is worked by a button at the side of the wrist. These catches save much time to a workman who has to change from one appliance to another.

A working arm which has found much favour with the returning pensioners is the McKay. The patentee of this arm has himself lost a hand and worked out the invention primarily for his own use. Duralumin is largely used in its construction and as in the Adams Arm the stump socket is made of this material. The distinctive feature of these arms is the rubber hand of which the fingers and thumbs are stiffened by central copper rods. The fingers can be bent to any shape desired and the thumb is flexed by a strong spiral steel spring and extended by shoulder action. The copper rods although malleable are yet stiff enough to enable quite heavy weights to be raised in the hand-grip. This is unquestionably a useful hand, but many men make little use of it, preferring appliances for their work.

In the discussion upon Vanghetti's Kineplastic amputations* at the meeting of the British Orthopaedic Association in November 1919 hopes were generally expressed that a useful working prosthesis for such cases would soon be forthcoming. Unfortunately up to the present time these hopes are unfulfilled, and there seems little present prospect of success.

The chief and probably insuperable difficulty lies in the want of power and sufficient range of movement in the motors. It is true that some motors can lift when directly harnessed to a weight or a dynamometer, as much as 20 lbs., but this is trifling compared with the force that must be exerted by the normal muscles at the points of insertion of their tendons. The plastic motor like the natural muscle must act on a lever at a disadvantage, so that a twenty pound pull may result in a grip of only three or four pounds. If the lever is lengthened in order to gain power, a longer excursion is needed than can generally be afforded, and mechanical difficulties are increased.

Some German writers have insisted on the necessary distinction between the palmar grasp for large and heavy objects and the finger-end grasp for small and light objects and they have devised different hands for these different grasps. Many men can

*See Journal of Orthopaedic Surgery. April 1920, page 212.

exert a force of 35 lbs. by the former and 10 or 15 lbs. by pressure between the end of the thumb and index finger in the latter.

Anything approaching this force is not to be hoped for from plastic motors, but for very light work or ornamental purposes prostheses for kinematized arm stumps, will probably prove practicable. For the lower extremity there is little need but more hope of success with the method.

The improved prostheses for the lower limbs which were available in 1915 and especially those for exarticulations at the hip, were so much better than most amputees expected, that they were very well received and there was little grumbling. There is now however an outcry for lighter limbs and attempts were made to satisfy it by the government and by limb making firms.

Duralumin and Celluloid and the combination of glue and muslin, above referred to as used for arms, are the materials which have been successfully tried, but the writer's experience leads him to believe that willow wood is still the best known material for stump sockets, and that the best light limb is one in which the wooden socket is combined with a frame-work and joints of duralumin or some similar alloy. There is however little demand for a limb lighter than those hitherto issued for below knee amputations, but even here a lighter foot will probably prove advantageous and is being experimented with. There is need of a lighter prosthesis for Syme's amputation, for the average weight of the regular patterns is about 3½ lbs. and there is a prospect of reducing this by one or one and a half pounds.

It may interest American surgeons to learn what are the average weights of the limbs (including hands) supplied at Roehampton at present for the commoner types of amputations.

They are as follows:

	Worker's arm	Dress arm
For shoulder amputations	4 lbs.	2 lbs. 6 oz.
For above elbow amputations	3 lbs.	2 lbs.
For below elbow amputations	2 lbs.	14 oz.

Artificial Legs

No. 1. For hip amputations	9 lbs.
No. 2. For short thigh amputations with steel hipjoint and pelvic band	6¾ lbs.

No. 3. For longer thigh amputations, below the middle of the femur ..... 5¼ lbs.
No. 8. For below knee amputations ..... 4¾ lbs.

Light duralumin limbs can be made for the above types weighing No. 1—6½ lbs., No. 2—4¾ lbs. and No. 3—4¼ lbs.

A limb with a well fitting socket feels much lighter to the wearer than a badly fitting one of the same weight, and a well balanced one lighter than an ill balanced one. It is to be desired that the centre of gravity of a No. 2 limb (i. e. one for thigh amputation, without metal hip joint or pelvic band) should be situated at or just below the Knee bolt.

The position of the artificial joints of limbs in relation to the centres of the corresponding natural joints is important and has been lately insisted upon by limb fitting surgeons. Limb makers have been generally in the habit of placing the artificial hip-joint in No. 2 limbs far too low. It has been demonstrated to them that this practice causes difficulty in walking and friction between the stump and the socket. The correct position is now insisted upon. This, in the case of a normal hipjoint is slightly above the level of the tip of the great trochanter and in front of it. How much in front of it it should be, depends upon the amount of rotation of the femur stump.

No one familiar with the problems involved in the manufacture and supply of prostheses will assert that finality has been reached. There is still room for and hope of improvement in details at least. Such information as we have of the artificial limbs hitherto supplied in other countries has not led us to imitate them. Certain American types of artificial limbs were of very great help to us at the beginning of the war and we think that they have been improved upon in the workshops in this country.

May we not look to the ingenuity and resource of American engineers and mechanics to make some revolutionary and as yet undreamt of advance in prosthetics?

THE MUSCULATURE OF THE FOOT, AND ITS TREATMENT BY ELECTRICITY

G. MURRAY LEVICK, LONDON

In dealing with the electrical treatment of the foot, I will take first that class of case in which nerve interruption or inhibition has led to degeneration of the muscles supplied by the internal popliteal nerve.

When a motor nerve is moderately injured or compressed, the first muscles to show R. D. and the last to recover are those that it supplies farthest below the seat of injury. Also as a rule they are the most profoundly affected, and after suture of a nerve they are the last to recover. Consequently in the cases with which we are dealing, we should always at once turn our attention to the intrinsic muscles of the foot, all of which, with the exception of Extensor brevis digitorum, are supplied by the internal popliteal nerve. Later on I will call attention to the extreme importance of these muscles, and show why in all cases where the internal popliteal nerve is affected, we should especially concentrate on the treatment of the foot. This is a point that is generally neglected.

Up to the end of the war, most of the cases of nerve injury that came under my care, exhibited tissues in the first stages of degeneration, and the affected muscles were in at least a fair state of nutrition and contractibility. Their treatment was therefore a simple matter. Suitable posture and galvanic contraction by the longitudinal method, with a little massage, were all that was needed to keep them going until regeneration had taken place.

Nowadays however, we find a very different state of affairs. Patients crop up from all sorts of holes and corners in which they are being discovered, suffering from nerve injuries inflicted years ago, but undiagnosed and left all this time without the special treatment they demand. In most cases these muscles have degenerated seriously. Sometimes actual fibrous degeneration with vacuolation renders their recovery impossible. In other cases it is touch and go.

With great care and perseverance we can coax some of these muscles back to usefulness, where ordinary routine treatment would fail absolutely.

One of the most noticeable things about a case recovering from internal popliteal nerve injury is the length of time that usually passes before the toes are bent on stimulation of their long flexors. It may be many months after recovery of the calf muscles, and I have observed a faradic response in Abductor hallucis before it was apparent in Flexor longus digitorum. I believe this is due to paralysis of Accessorius so that the tendons of Flexor longus digitorum are not taughtened by that muscle, and its contractions, after its recovery to faradic stimulus, are absorbed in the process of "taking up the slack."

In cases we now commonly see, where the intrinsic muscles of the foot have been neglected so far that they will never recover properly, this is a disability to be counted on. Another point to be carefully guarded against is the fixation deformity of the tarsal joints as a result of general failure of the blood supply to the foot.

To turn now to the subject of treatment. In all cases where the Internal Popliteal nerve is involved, when giving galvanic treatment to the leg muscles, I have the patient seated on a couch with his foot placed flat on the bottom of an ordinary porcelain arm bath placed on a chair. The masseuse sits on another chair so that the foot and leg are at a convenient height for her. The indifferent electrode, made of carbon, is placed in the water facing the toes all the time the active electrode is being used upon the leg muscles so that the current, interrupted by the nutronome, streams through the foot and scatters through the small muscles which all get a share of the treatment. When I first tried this method, the improvement of the nutrition of the whole foot was so remarkable that I have adopted it as a routine.

It is certainly a fact that the nutrition of the foot improves long before the muscles show any signs of response to faradic current, and this is probably due largely to the action of the interrupted galvanic current in restoring the muscular coats of the arteries. During part of the treatment, the current should be reversed so that the foot muscles get the benefit of the anodal and of the current.

Having outlined the above treatment, I will not proceed to the treatment of feet unaffected by nerve injury, and to an interpretation of the roles played by some of the intrinsic muscles, which appear to be of great importance, and which I have not seen recorded in any of the text books on Anatomy.

The treatment is applicable when the preliminary stages of flat-foot are curable by physio-therapy, and to the after treatment of those more advanced cases which have been wrenched and fixed in plaster, or undergone surgical operation.

Regarding the first class, there are many people walking about the streets, suffering from what they describe as tender feet, and these people, experiencing pain on movement of the tarsal joints, avoid this as far as possible by planting their feet flatly on the ground, with the toes pointing too far outward. This leads them through the successive stages of flat foot.

The commonest causes of tender feet apart from uncleanliness, are deformity of the first metatarso-phalangeal joint, and passive wasting of the intrinsic muscles together with compression of the soft tissues by ill-fitting boots and shoes.

Of the first of these causes it is enough to say that almost the whole of civilisation is engaged in deforming its feet by dragging the great toe outward so as to stuff it into a boot which fashion decrees shall be shaped like a lead pencil.

The wasting of the intrinsic muscles and compression of the soft tissues are due to the support given by the boot which relieves some of these muscles of their proper role, so that they fall into disuse, become wasted and unhealthy, and a ready receptacle for fatigue products and other toxins, and the circulation of the whole foot becomes impaired, the tarsal joint suffering in common with the rest of the part.

As walking in the manner described above, entails the relaxation of Tibialis posticus and the toe flexors as well as the other intrinsic muscles of the foot, re-development of all these is needed in order to regain muscular support for the foot.

The role played by the flexors of the toes, (especially Flexor brevis hallucis and Flexor brevis digitorum) in supporting the longitudinal arch of the foot, is a very important one indeed, because when the weight of the body is thrown forward onto the toes with the heel off the ground, the action of both long and short flexors is to draw the heel towards the toes, acting as bowstrings across the arch from heel to toe.

For this reason the correct way to land from a jump, is to have the whole weight of the body borne between the balls of the

feet and the end of the toes. Also when patients are given heel-raising exercises from the standing position, this distribution of the weight should be carefully taught, by telling them to "grasp the floor with the toes," which thus become the fixed points from which their flexors act.

Flexor brevis digitorum, being inserted into the basal phalanges, is at a mechanical disadvantage in bending the toes, compared with Flexor longus, and therefore acts more strongly as an arch raiser.

The flexors of the toes should be used to assist progression in walking quickly or running, those of the great toe being of special importance.

With the above notes in mind, the efficacy of the following treatment will I think be clear.

The foot is placed in an ordinary porcelain arm bath as before, but in this case the heel rests on one carbon electrode while the other, being the other terminal of the circuit, is dipped in the warm water which should reach to just below the malleoli.

This electrode is held in the left hand while the other hand is used to manipulate the core of a Smart Bristow coil. Graduated contraction of any of the intrinsic muscles of the foot can now be obtained in a particularly useful and pleasing manner. It is almost similar to a method I devised about three years ago for the treatment of certain stages of trench foot, and described in the British Medical Journal. As we proceed to carry out this treatment and place the active electrode in the position needed to stimulate the desired group of muscles, a very clear view is gained of the action of the dorsal interossei in raising the transverse arch of the foot. It is seen that this is a strong action and emphasises the importance of these muscles. As the core of the coil is introduced and withdrawn in a rythmical manner, the transverse arch is seen to rise and fall and the foot to narrow and widen in time with the rise and fall of the current, and a clear mental picture can be formed of the dorsal interossei, with their bi-pennate origins, drawing the metatarsal bones together. To describe the action of one of these muscles will suffice to explain the action of the rest. We will consider the second metatarsal bone as the "keystone" and as the middle line.

When the second dorsal interosseus muscle contracts, it performs the following roles in the order given. These roles have been carefully observed during electrical stimulation of individual muscles, and then of the group as a whole.

(1) Feeble contraction. Abduction of first phalanx from middle line.

(2) Stronger contraction. Flexion of metatarsophalangeal joint, plus the pull on the extensor tendon. End of toe brought into contact with the ground. (In voluntary movement, this contact is of course strengthened by the long and short flexors.)

(3) Powerful contraction. The fixed points from which the muscle acts are now (a) the second metatarsal bone, (b) the insertion of the tendon into the first phalanx. As the muscle contracts, the third metatarsal bone is drawn towards the second, i. e. towards the middle line.

In voluntary movement, the second metatarsal is fixed by the opposition of the first dorsal interosseus muscle, which also fixes the first phalanx of the second toe, while it is drawing the first metatarsal bone towards the second, and so on.

As each metatarsal bone is drawn toward the second metatarsal, it is pulled into a plane below that of its more mesial neighbour.

If the technique above described is properly carried out, it will be seen that the arch raising action of the dorsal interossei is very powerful, and that these muscles must be regarded as of great importance.

Still more strongly is the impression given of the action of the short flexors of the toes in raising the longitudinal arch while the toes, acting as fixed points, press the bottom of the bath. The marked action of Abductor hallucis shows how it can still be trained to assist in maintaining an improved position of the great toe, should it be desired to correct this by mechanical means.

Having now given the required exercise to the intrinsic foot muscles, Tibialis posticus and the long flexors of the toes can be stimulated by disconnecting the active carbon electrode from its rheofor, which is now inserted into a button electrode covered by a handful of wet lint and applied to the desired motor points in the leg. The longitudinal arch will be seen very plainly to rise at

each contraction of the long toe flexors as well as of Tibialis posticus.

The method of electrical treatment outlined above is strongly to be recommended as a preliminary to voluntary exercise. It is a waste of time and discouraging to the patient to being re-education before the intrinsic muscles of the foot are in at least a fair state of nutrition. I regard it as inseparable from the satisfactory treatment of flat-foot, after seeing the surprisingly good results that it yields. Often it is extremely difficult or impossible to re-develop the small muscles by voluntary exercise alone. This applies especially to those cases that have been repostured by surgical methods, so that they are suddenly relaxed after a long period of overstretching with its accompany atony.

Discussion

Mr. R. C. Elmslie: Mr. Levick has called attention to a group of muscles which everybody, including ourselves, have been apt to overlook or to neglect too much in the past. The intrinsic muscles of the foot are not vestigial remnants from the time when the foot was used for another purpose: they have a real function in the use of the foot at the present day. Not so much in my hospital practice, but in private I seem to be continually occupied in treating people who have, apparently, good feet, but they are causing them trouble, for the reason that they are using them all wrong, and generally because they have lost the transverse arch of the feet, and have forgotten how to use their intrinsic muscles. These people I have been trying to re-train to use those muscles, to get their toes on to the ground, and make use of the toes as factors in progression at each step.

What interested me particularly in what I heard was his demonstration of the action of the dorsal interossei, not merely as flexors of the metatarso-phalangeal joint, but as elevators of the transverse arch. If that is true—and I do not suggest it is not true—it is new to me. If these dorsal interossei can be worked up, here is a possibility of improving these people who have a flattening of the transverse arch, people whom most of us have been in the habit of considering beyond mechanical correction, and as only capable of being made reasonably comfortable. If Mr. Levick can show that he can elevate that arch by working up the power of the dorsal interossei, here is a possibility of curing dropping of the transverse arch of the foot, a very important point indeed to all foot-surgeons.

Mr. Aitken: I endorse the appreciative remarks made by Mr. Elmslie, and I regret that illness prevents our colleague Mr. Trethowan from being with us, as there is no subject which would have afforded him greater pleasure than a discussion relative to the flexors. Those of us who have been demonstrators of anatomy will agree that we have frequently to point out

the position of the dorsal interossei as being more towards the plantar aspect than we were inclined to believe, and I think Mr. Levick might have made more of that origin, in which there is produced that gripping action, and of which he gave us a demonstration, such as I have not before appreciated.

I have not previously regarded Mr. Elmslie as a pessimist, and his statement that these cases of flat foot are beyond mechanical correction is a statement with which we cannot all agree. But there is one thing which arises out of Mr. Levick's paper in relation to transverse flat-foot to which I intend to pay even more attention in the future; the deliberate treatment of toe movements and trying to re-educate these people to use their toes, so getting the middle of the arch to come up. We should appreciate a demonstration of that, if it could be given.

MR. LEVICK (in reply): I thank Mr. Elmslie and Mr. Aitken very much. I want to make quite clear that the electrical treatment I advocate is only as a preliminary to voluntary exercises, never with the object of taking their place altogether. The point is, that when we start on these muscles they are often, so much wasted that we throw away weeks, perhaps months, in trying to get the patient to use them voluntarily, whereas faradic means first will enable exercises to be used effectively at a very much earlier stage.

STATIC DEFORMITIES AS A FACTOR IN THE PRODUCTION OF SO-CALLED HYPERTROPHIC ARTHRITIS

ROBERT PATEK, M. D. SAN FRANCISCO.

In the present confused nomenclature of the arthritides it is necessary at the outset to define exactly the particular condition one is dealing with. In this paper the classification of Ely[1] is followed. He divides the chronic arthritides into two types.

Type I. Those that show no bone production at the joint line nor spurring at the lines of insertion of the capsule. In this type the tubercular, gonorrheal, luetic, typhoid organisms, etc., are the exciting causes.

Type II. Those joints showing spurring. "In the latter type the gross changes are: cartilaginous and bony lipping at the circumference of the joint, with lipping at the intersection of the capsule; thickening of the cartilage, then calcification and erosion leaving the underlying bone bare; condensation of this bone (eburnation) with grooving in the line of joint motion; thickening of the synovial membrane with or without villous formation. On section the essential feature is an aseptic necrosis with cavity formation in the bone a short distance from the joint surface." Ely believes the primary change is in the bone and bone marrow; the cartilageous changes are secondary.

At the Stanford Orthopedic clinic during the last year, July 31, 1919-July 31, 1920, 72 cases of hypertrophic arthritis were admitted out of a total of 846 cases; namely 8½%. Alveolar infection was present in about 90% of these cases. This is probably more than a coincidence. But cultures made from these joints (operated upon by Doctor Ely[1]) have always proved sterile. Likewise no organisms have ever been found in sections.

Until Koch's criteria are fulfilled: namely, the isolation of an organism in pure culture and the reproduction of the disease with it, the acceptance of infection as the etiological basis must be held in abeyance.

[1]Ely, Leonard W., Archives of Surgery, Vol. I. The term hypertrophic arthritis is not used or approved by Ely; instead he uses the term Arthritis Type II. Hypertrophic arthritis is a misnomer. The process is in fact an atrophic one. The Germans call the disease arthritis deformans.

It is with the factor of the trauma of strain as the basic cause of hypertrophic arthritis that this paper deals. An article by Preiser[2] "Static joint diseases, their etiology and their relation to arthritis deformans" gives a detailed account of his idea of the steps that begin with static strain and lead to hypertrophic arthritis. The first step is a change in relation ship of two articulating surfaces. Thus in fracture of the femoral neck there is practically always some displacement of the proximal fragment and this in turn brings about a change in the relationship of the cartilage of the head with the cartilage of the acetabulum. Also the soft tissues of the joint are subjected to strain and there is torsion of the capsule and ligaments; with this goes a change in the nutritive vessels that run into the joint; there now follow structural changes; namely, fibrous change in the cartilage; it will degenerate and the condition of lipoma-arborescens arises; and finally the condition characterized as arthritis deformans is seen. The static change need not be due to fracture but any condition that produces abnormal joint relationships may initiate the process of hypertrophic arthritis; thus: coxa vara, flat foot, etc. And the change having taken place in one joint, of necessity throws the related joints under strain and initiates similar structural changes in them. Where Preiser finds two adjacent (hypertrophic joints) he believes that one precedes and gives rise to the other. This is the very essence of his theory. But it would be quite as logical to assume that two such joints arose independently from like or unlike causes. In other words, both might be due to infection.

Hypertrophic arthritis is essentially a disease occurring late in life. Our youngest case occurred at twenty-six years of age. Yet many deformed individuals have their joints under abnormal strain from the time they begin to walk. Accepting Preiser's theory, it takes such individuals never less than twenty years, usually over thirty years, to prove his thesis. Lastly, Heberden's nodes, one of the classic findings in the disease cannot be related to strain.

There is an economic interest to Preiser's theory. If hypertrophic joints arise from the trauma of strain, workingmen in occupations which place joints under abnormal strain are entitled to compensation, should they develop hypertrophic arthritis.

[2]Preiser, Georg. Static joint diseases, their etiology and relation to arthritis deformans. Am. Jour. Arth. Surg. 1912-1913 X 100.

Ely and Cowan* have done a series of experiments, shedding some light on this subject. They repeated in part the work of Axhausen. "Archiv fur Klinische Chirurgie 1912 xcix 519" Axhausen working on rabbits and dogs injured the joint cartilage with an electric needle. He stated that lesions typical of "arthritis deformans" followed, namely a "dissecting inflammation in the marrow and the formation of "Randexostosen" (lipping) at the circumference of the cartilage of the injured bone and that of the other bones of the articulation." In other words, injury to a joint cartilage initiated and established the changes seen in hypertrophic arthritis. His method is not exact. He probably injures the marrow as well as the cartilage.

The experiments of Ely and Cowan are grouped under three heads depending on the amount of injury done to the cartilage of the intercondylar surface of the femur.

In the first group the cartilage was simply cut to the bony buttress or gouged out; or burned with the actual cautery to the bony layer. In no case did anything resembling hypertrophic arthritis result. The cut edges tended to squeeze their edges together. Where the cartilage is gouged out the tendency is for it to grow in but leave as a rule a pitting. Where the cartilage is burned out the hole may fill in with fibrous tissue which latter becomes cartilaginous; in the majority of the cases the repair is slight and incomplete.

In the second group of experiments a large area of cartilage between the condyles of the femur was removed with a scalpel. The results here are most variable. The cartilage may fill in partly or completely or remain entirely absent. This latter holds for the majority of cases. In a few cases changes corresponding to Axhausen's Randexostosen were found, but in the great majority these changes did not take place. In the great majority the joint changes were localized to the area of injury; in other words, no general joint changes were set in motion.

In the third series the cartilage was removed from the intercondylar groove and partly from the condylar eminences. A hole was bored through the bone to the marrow. The results in this series are as follows: New cartilage is formed over the denuded

*Ely, Leonard W., and Cowan, John Francis, Bone and Joint Studies, Le land Stanford Junior University Publications, University Series 1, 1916.

areas more or less completely. This new cartilage is formed to a large extent by the synovial membrane spreading in from the circumference. As this new cartilage growth is more complete than in the second series it seems likely that the marrow takes part in the formation of new cartilage. In fact, the whole process of plugging up the hole with bone and cartilage in this series seems to have been through the activity of the marrow. The new cartilage is always irregular in structure and usually in outline. The hole is always closed by bone and the bone trabeculae are thickened. The joint changes are limited as a rule to the injured area. Function remains perfect. The new formed cartilage has much the same appearance as has the cartilage in "arthritis deformans." In other words, following the type of injury described in their experiments there is an actual regeneration of the destroyed tissues.

Now Ely believes from his experiments and from human material that the order of events in hypertrophic arthritis is, first, injury to the marrow, then follows aseptic necrosis in the *bone* below the joint and lastly the lipping about the joint. Axhausen has interpreted a final structural stage of the disease as the disease itself.

But ideal and experimental evidence is readily and abundantly at hand, found in the X-ray plates dealing with such conditions as Pott's' fracture and Colles fractures. Surely the normal alignment of these joints is always more or less disturbed. Again in the congenital deformities, namely: club foot and congenital dislocation of the hip, according to this static theory of etiology, the knee and hip on the affected side should give a hypertrophic arthritis. In the partial or complete ankylosis of any joint, such as occurs in tuberculosis of the hip or knee or ankle, the unaffected joints should show in time the hypertrophic changes. Scoliosis is a condition that obviously puts the joints of the spine under abnormal strain. And, finally, the deformities of rickets should be potent in producing this disease.

The following plates have been examined:

TABLE OF X-RAY PLATES

Case No.	Plate No.	Age.	Diagnosis	Findings in associated joints
1	19182	Adult	Marked coxa vara both hips; posterior dislocation of the left hip	No hypertrophic arthritis
2	19594	Adult	Left hip coxa valga	No arthritis
3	16966	25	Old Pott's united with some internal bowing of the ankle and some roughening of lower articular surface of the tibia	No arthritis
4	57226	44	Colle's fracture with marked dorsal angulation of distal fragment and considerable callus formation	No arthritis of wrist bones or phalanges
5	31924	55	Scoliosis of lumbar spine, with convexity to left	Slight spurring about lumbar bodies
6			Tuberculosis of 4-5 lumbar spine. Bodies collapsed. 4 years duration.	No arthritis other vertebrae
7	16655		Old Pott's union of fibula internal malleolus displaced externally, not united. Also external displacement of the astragalus on the tibia.	Spur on the scaphoid
8	Adult	34	Pronated feet, knock knee	No arthritis spine, feet or knees
9	Private Case		Old dislocation terminal phalanx great toe	No arthritis other joints of feet
10		45	Congenital malformation spine	No arthritis
11	30280	35	Scoliosis with rotation of the body of the 4th lumbar to left	No arthritis
12	30195	36	Lumbar spine shows scoliosis with convexity to left; failure of union of spinous process of the last sacral segment	No arthritis
13	30913		Scoliosis with convexity to the right	No arthritis
14	30326	30	Scoliosis lumbar spine with convexity to left	No arthritis
15	31106	44	Scoliosis lumbar spine with convexity to left	No arthritis
16	30625	62	Scoliosis lumbar spine with convexity to right	No arthritis
17	30758	25	Scoliosis lumbar spine with convexity to right	No arthritis
18	31061	25	Lumbar scoliosis to the right	No arthritis
19	30259	40	Scoliosis dorsal spine with convexity to right	No arthritis
20			Tuberculosis 4-3 lumbar spine: fusion of bodies	No arthritis other vertebrae
21	31969	23	Marked scoliosis; double curve of the spine not secondary to bony defect	No arthritis
22	31924	55	Scoliosis of lumbar spine with convexity to the left	Slight spurring about lumbar bodies

23	25663	29	Destruction 4th and 5th lumbar bodies with marked list to right in lumbar region	No hypertrophic arthritis in other vertebrae
24			Scoliosis, right dorsal left lumbar curves	No arthritis
25			Tuberculosis ankylosis left hip joint	Right hip normal no hypertrophic arthritis
26			Right hip destruction of head; tuberculosis	Opposite hip joint normal
27		36	6th lumbar vertebra sacralized on right side	Remainder of spinal column normal

The percentage of cases with hypertrophic arthritis in which static strain is also present is 11 per cent. But this is practically the same as the percentage seen in all cases coming to this orthopedic clinic.

From another point of view this theory fails. I have seen a number of cases of hypertrophic arthritis in individuals whose posture is excellent, and who have never done hard work or subjected their joints to strain. These cases nearly always have bad teeth. In other words, the disease occurs where none of Preiser's etiological factors apply, and conversely, it may not appear where trauma strains are most potent.

Conclusion: Hypertrophic arthritis is not due to static strain.

OBSERVATIONS ON THE OPERATIVE TREATMENT OF SCOLIOSIS

BY ROYAL WHITMAN, M. D. NEW YORK

*These remarks apply primarily to a class of cases of fairly advanced scoliosis, in which backward projection of the ribs is the most noticeable element. The typical patient is a girl of sixteen or over, to whom the deformity has become a serious concern, and who is willing to undertake any form of treatment that will assure its reduction or concealment.

I think we are indebted to Dr. Abbott for the general recognition of the fact that deformity of the spine, as of any other part, can be cured only by over correction and by fixation for a sufficient time to permit the reconstructive changes that alone can assure stability. When, therefore, it had been demonstrated by a thorough and prolonged trial, that cure in this sense was as unattainable, in this class of cases by the Abbott as by any other method, a definite basis at least, for rational treatment was established. For even admitting that extreme distortion of the trunk by the Abbott method is, from the mechanical standpoint, the most effective method of lessening rotation of the spine, its manifest disadvantages as a means of partial correction, exclude it from practical consideration.

During the period of stagnation that followed this conclusion it occurred to me, in view of the objections to prolonged forward flexion of the trunk, that hyperextension and rotation might be tried, although Lovett's experiments had seemed to indicate that the spine was so locked in extension as to check rotation.

Assuming this to be true, it seemed that this attitude by relieving pressure on the vertebral bodies must at least lessen the resistance to correction of the lateral deviation.

At first extreme rotation was attempted by including the arm on the lower side, which was soon discontinued, but in a modified form the method in which the jacket is applied under lateral traction with as much hyperextension as possible, and cut in the usual

*Observations on the operative treatment of scoliosis. Presented at the Clinical Conference, Hospital for Ruptured & Crippled, May 18, 1921.

manner over the depressed areas, to permit expansion, has been employed since this time.[1] It would seem also from X-Ray evidence, that it is as effective in lessening rotation as is forward flexion, although the apparent correction as indicated by distortion of the trunk is, of course, much less.

Although this treatment, which increases the height and improves the appearance of the patient, is free from the greatest drawback of the Abbott method, all forms of corrective plaster support, applied for long periods have the disadvantage of compressing the thorax, inducing muscular atrophy, and in some instances irritation of the skin. This would be of slight importance if over correction and stability could be finally attained, but since this is impracticable, it is of advantage to supplement ambulatory correction by a period of fixation on a convex stretcher frame.

This position, as I pointed out many years ago, in advocating the convex frame in the routine treatment of Pott's disease in young children[2] exerts the most direct extending force on the spine, in the sense of separating the vertebral bodies, and it has the further advantage of increasing the lateral diameter of the chest. In the treatment of lateral curvature the pressure on the back tends to lessen the convexity of the ribs, to push them forward, and thus to expand the chest on the contracted side.

After a time ambulatory correction may be resumed, but preferably the final step is an operation for inducing ankylosis of the dorsal vertebrae, in order to assure the extended position, thus preventing flexion in this region which makes the deformity more apparent. By effacing the spinous processes one removes also the landmark from which lateral deviation is estimated, so that the immediate effect of the operation is an apparent considerable reduction of deformity. It would appear also, that the complete removal of the muscular attachments to the vertebral column should lessen its resistance somewhat, so that the deformity may be still further corrected by the subsequent fixation on the frame during the period of consolidation.

[1]The method was demonstrated at a meeting of the alumni of the Hospital for Ruptured & Crippled Dec. 28th, 1915. Am. J. Orth. Surg. Vol. 14 p 155.

[2]Trans. Amer. Orth. Assn.—Vol. 14, 1901.

The operation if confined to the dorsal region has the very great advantage that motion here being comparatively limited, its further restriction causes no inconvenience.

The operation that I favor is of the Forbes type, rather than the original Hibb's fusion, in which comparatively large sections of bone are pried up from the laminae, to bridge the intervals between them, and the spinous processes split into two or more segments, are flattened out laterally, to make a wide area for ankylosis. It is possible also, if the transverse processes were cut through on the convex side that the resistance to the corrective pressure of recumbency on the ribs might be still further lessened.

A fair degree of resistance to forward bending soon appears in the operated area, but recumbency is encouraged because of the corrective influence of pressure on the thorax, for as long a time as the patient will submit to it—usually for two months,—after which a short jacket to hold the trunk in the proper relation to the pelvis, is applied.

It is assumed that if the dorsal deformity is reduced, the lumbar deviation, which has been lessened by the treatment, may be eventually concealed by an ordinary corset.

It is, of course, evident that the preliminary reduction of deformity might be more rapid if the patient were placed on the frame in the beginning, or if recumbency were enforced in connection with the corrective jackets. There is however, the practical objection, that few patients of this class would submit to immediate and prolonged confinement who eventually accept it as a later step in treatment, and finally consent to operation to assure the correction that has been attained.

My interest in operative treatment was aroused by the discussion at the meeting of the Orthopaedic Association in 1920, and during the past year twelve patients have been operated upon in my service by members of the assistant staff and myself. The youngest patient was 13, the oldest 27 years, thus all were of an age in which the ankylosis of the dorsal region would cause no functional inconvenience nor developmental disturbance.

The time is too short to report final results, but the immediate effects have been very satisfactory to the patients, and the indications are that the improvement will be permanent.

It will appear that the purpose of the treatment in the cases reported is clearly defined, namely: to conceal deformity by effacing the most offensive manifestation, and to check its further progress. It seems to me that for the attainment of the object, the method of preliminary correction supplemented by the convex frame as a means of extending the spine, expanding the chest, and directly reducing deformity by postural pressure, has certain practical advantages over the routine in other clinics, and for this reason this preliminary report is presented.

Editorial

At a formal meeting in Boston June 4, 1921, to consider the report of the Editorial Committee, the American Orthopedic Association decided to return the Journal of Orthopedic Surgery to Boston for publication. A substantial fund was provided for the continuation and improvement of the Journal.

Any publication venture during the past few years has been difficult and even at times precarious. The present editor in presenting his final issue to the readers desires to thank all those who have helped to produce and who have been readers and friends of the Journal of Orthopedic Surgery during the past two years.

The Journal has now more than three times as many subscribers as it had about two years ago. It seems to be rendering a real service to the growing cause of Orthopedic and Reconstruction Surgery. This periodical as much as any other agency helps to carry on the torch which lights the way to relief for the patients in whom we are all so much interested.

For Dr. E. G. Brackett of Boston, the new editor, we bespeak the same friendly interest and hearty support which have meant so much to the retiring editor. H. WINNETT ORR.

The Editor and the Editorial Committee of the Journal have under consideration the possibility of changing the Journal from a monthly to a quarterly publication. The larger volume, issued at longer intervals, would give certain opportunities for preparation not possible in the monthly publication, and would probably afford a larger total amount of material during the year. The Committee would be grateful for the expression of opinion of the subscribers of their attitude toward such a possible change,—first, as to whether it would meet their approval; second, if not, as to their reasons for preference of the continuance of the monthly publication.

Please address communications to the Editor, Dr. E. G. Brackett, 166 Newbury Street, Boston, Mass.

The following resolutions were adopted at the Boston meeting:

The American Orthopaedic Association assembled in Annual Meeting pays mournful tribute to its charter member and beloved colleague, Arthur J. Gillette. A man of unexampled amiability, devoted to his profession as represented by its loftiest ideals, a worker of unremitting industry, a craftsman of highest skill, his passing leaves amongst us a void which we cannot adequately express in words. We desire to record our appreciation of his high value as a friend and colleague, our recognition of his work in establishing the first hospital for Crippled Children under State Control in the United States. We shall ever cherish his memory.

RESOLVED that the American Orthopaedic Association extends to the family of our deceased colleague their sincere sympathy and present to them this heartfelt tribute to a highly esteemed colleague.

The members of the American Orthopaedic Association desire to place on record their sense of loss in the death of Dr. Harry M. Sherman. For many years a faithful and devoted member of the Society he gave of his best to that as he did to everything with which he was associated—a skillful surgeon and teacher, a delightful companion, a loyal friend, his absence will be deeply felt. It is the desire of this Association that this resolution should be transmitted to his family with an expression of the sincerest sympathy in their loss.

Whereas God, in his infinite wisdom, has seen fit, on May 9, 1921, to take from our midst, Dr. Harry M. Sherman, our first President, and deprive us of his valued counsel, helpful friendship, and pleasant companionship;

Be it therefore resolved that we take this means of expressing our deep grief over the loss of a member noted for his high ideals, honesty of purpose, personal integrity, and constructive surgery and scientific attainments. He was a good husband, a kind father, a loyal friend and a scientific gentleman.

Be it further resolved that a copy of these resolutions be inscribed on our minutes and copies sent to his widow, and to the California State Medical Society, and the Journal of Orthopaedic Surgery. PACIFIC COAST ORTHOPEDIC ASSOCIATION.

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News Notes

Dr. O. L. Miller, who has for a number of years been practicing Orthopaedic Surgery in Atlanta, and associated with Dr. Michael Hoke in the Scottish Rite Hospital for Crippled Children, has moved to Gastonia, N. C., to be Orthopaedic Surgeon to the North Carolina Orthopaedic Hospital.

This hospital, with a capacity of sixty beds, has recently opened for the reception of its first patients.

In addition to his duties with the hospital, Dr. Miller will be in private practice in Gastonia.

Dr. H. Winnett Orr and Dr. James E. M. Thomson have formed a partnership for the practice of Orthopedic Surgery exclusively and will remove their offices to the First National Bank Building, Lincoln, Nebraska. Dr. E. E. Babcock is also associated with the firm.

Dr. Archer O'Reilly and Dr. C. A. Stone of St. Louis have removed their offices from the Metropolitan building to 3534 Washington Avenue.

Orthopaedic Titles in Current Literature

Prepared by Dr. J. E. M. Thomson, Lincoln, Nebraska.

Abrahamsen, H. Epiphyseolysis Capitis Femoris Principally in Regard to Coxa Vara. Octa Chirurg. Scand., 1921, LIII, p. 230.

Allen, L. A Lacerated Wound into the Knee Joint Treated by Complete Closure and Immediate Active Mobilization. Boston M. & Surg. J., 1921, CLXXXIV, p. 167.

Ashurst, A. P. C. The Open Reduction of Fracture of Forearm (dressing). Surg. Clin. North Am., 1921, 1, p. 175.

Auerbach, S. The Differential Diagnosis Between Tumor of the Spinal Cord, Serous Circumscribed Spinal Meningitis, and Caries of the Spinal Column. Ztsch. J. d. ges neurol. u. Psychiat., 1920, LX. p. 1.

Babcock, W. Wayne. End Results in 608 Cases of Peripheral Nerve Injury. Penn. Med. J., April, 1921, 24, No. 7, p. 533.

Beedle, G. A. Fracture of the Os-Calcis With Dislocation of the Astragalus; Report of Cases. J. Missouri State M. Assn., 1921, XVIII, p. 54.

Bethe, A. Results of Kineplastic Amputations. Münchener medizinische Wochenschrift, Munich, April 22, 1921, 69, No. 16, p. 479.

Betz, I. Treatment of Arthritis by Nonspecific Therapy. Med. Record, May 28, 1921, 99, No. 22, p. 920.

Bloch, R. Fracture of Neck of Femur in the Young. J. de Chirurgie, Paris, May, 1921, 17, No. 5, p. 417.

Block, W. Unilateral Dislocation of the Pelvis with Wire Extensions Method Applied to the Pelvic Brim. Deutsche Ztschr. f. Chir., 1921, CLX, p. 113.

Borelli, E. Complex Dorsal Luxation of the Right Index Finger: Duplex Mechanism of Irreducibility: Operative Reduction. Policlin. Roma, 1921, XXVIII, sez. prat., p. 115.

Bradford, E. H. Spinal Curves in Growing children. Boston Med. and Surg. J., May 19, 1921, 184, No. 20, p. 512.

Brown, Maud Forrester. The Possibilities of Suture After Extensive Nerve Injury. J. of Orthop. Surg., June, 1921, Vol. 3, No. 6, p. 277.

Cadenat, F. M. Cineplastic Surgery of the Upper Limb. Rev. d. Orthop., 1921, XXVIII, p. 5.

Casati, E. A Case of Total Fracture of the Acetabulum. Policlin. Roma, 1921, XXVIII, sez-prat., p. 118.

Charier. The Treatment of Congenital Luxation of the Hip; The Position in the First Apparatus. Rev. d' Orthop., 1921, XXVIII, p. 49.

Chatzkelsohn, B. An Ambulatory Splint with Elastic Extension in Fractures of the Lower Extremity. Deutsche Ztschr. j. Chir., 1920, CIX, p. 145.

Clark, W. T. Bloodless Surgery in Flat Foot. Med. Record, May 22, 1921, 99, No. 22, p. 921.

Cohen, H. Willems Treatment of Joint Lesions. N. Y. Med. J., May 18, 1921, 113, No. 14, p. 730.

Cohn, I. Dislocations of Semilunar Carpal Bone. Annals of Surg., May, 1921, 73, No. 5, p. 621.

Coues, W. P. The Diagnosis of Some Chronic Shoulder Injuries. Boston M. and S. J., 1921, CLXXXIV, p. 176.

Cushing, H. Special Field of Neurologic Surgery After Another Interval. Ohio State Med. J., May 1, 1921, 17, No. 5, p. 293.

Da Costa, J. C. Pulsating Central Sarcoma of the Lower End of the Humerus. Surg. Clin. North Am., 1921, 1, p. 67.

Delbet. Traumatism of Spinal Cord. Progres Med., Paris, April 9, 1921, 36, No. 15, 169.

Destot, E. Traumatic Lesions of the Wrist. Lyon Chirurgical, Lyon, March-April, 1921, 18, No. 2, p. 164.

Dragotti, G. Pain in the Feet. Policlinico, Rome, April 23, 1921, 28, No. 17, p. 585.

Eising, E. H. Willem's Treatment of Knee-Joint Injuries. N. Y. Med. Jour., May 18, 1921, 113, No. 14, p. 734.

Elliott, J. D. Acute Suppurative Osteomyelitis. Hahneman. Month., 1921, LVI, p. 131.

Elmslie, R. C. Charcot's Disease of the Spine. Proc. Roy. Soc. Med., London, 1921, XIV, Sect. Surg., p. 56.

Fairbank, H. A. T. A Case of Bilateral Snapping Hip with Functional Varus. Proc. Roy. Soc. Med., London, 1921, XIV, Sect. Surg., p. 61.

Feild, E. E. Fractures of Forearm, Including Injuries to Elbow and Wrist Joints. Virg. Med. Monthly, May, 1921, 48, No. 2, p. 98.

Fiebach, R. Traumatic Luxation of the Knee Joint. Arch. j. Orthop., 1920, XVIII, p. 442.

Fossataro, E. The Usual Treatment of Traumatic Lesions of the Hands in Relation to the Inabilities which Result from Them. Policlin., Roma, 1921, XXVIII, sez, chir., p. 1.

Fraenkel, J. The Late Results in Congenital Club-foot. Ztschr. j. Orthop., Chir., 1920, XL, p. 451.

Goddu, L. A. O. Fracture Dislocation of the Third Cervical Vertebra. Boston M. & S. J., 1921, CLXXXIV, p. 179.

Fascia Used to Mobilize a Stiff Knee. Boston M. & S. Journal, 1921, CLXXXIV, p. 198.

Gorres. Treatment of Rachitic Curvature of Lower Third of Leg. Münchener medizinische Wochenschrift, Munich, April 1, 1921, 68, No. 13, p. 392.

Gretsel. The Operative Treatment of Severe Talipes Equinus. Muenchen Med. Wchnschr., 1920, LXVII, p. 1412.

Hammer, A. W. Painful and Disabled Shoulders. Am. J. Surg., 1921, XXXV, p. 29.

Hanusa, K. Whitlow with Gangrene at End of Finger. Zentralblatt für Chirurgie, Leipzig, April 2, 1921, 48, No. 13, p. 445.

Harnsberger, S. Fractures—Personal Experience and a Suggestion. Internat. j. Surg., 1921, XXXIV, p. 58.

Harrenstein, R. J. The Albee Operation in Pott's Disease. Nederlandsch. Tijdschrift v. Geneeskunde, Amsterdam, April 23, 1921, 1, No. 17, p. 2279.

Hartleib, H., and A. Lauche. Posterior Thoracic Notomelta with Spina Bifida. Zentralblatt für Chirurgie, Leipzig, April 23, 1921, 48, No. 16, p. 558.

Henderson, M. S. Non-Union of the Humerus: Repair by Means of the Bone Graft. South M. J., 1921, XIV, p. 148.

Higgins, T. T. A Case of Subluxation of the Right Hip Joint Following Trauma. Proc. Roy. Soc. Med., London, 1921, XIV, Sect. Surg., p. 62.

Hitzrot, J. M. and C. R. Murray. The Factors that Influence the Prognosis in Fractures at the Base of the Radius. Am. J. Surg., 1921, XXXV, p. 17.

Jehn, W. Technic of Closure of Large Wall Defects. Zentralblatt für Chirurgie, Leipzig, April 9, 1921, 48, No. 14, p. 477.

Jopson, J. H. Old Fracture of the Patella; Treatment by Open Operation, Wiring of the Fragments, and Suture of the Fascia and Aponeurosis. Surg. Clin. North Am., 1921, 1, p. 225.

Jones, R., Liverpool. The Cameron Lecture on the Necessity of Orthopedic Training; Its Relation to the Prevention and Cure of Deformities. Brit. Med. J., 1921, 1, p. 181.

Kawamura, J. My Method of Treating Fractures. Wien. Med. Wchnschr., 1921, LXXI, p. 21.

Keller, H. Orthopedic Surg. from Psychologic Point of View. N. Y. Med. J., May 18, 1921, 113, No. 14, p. 735.

Koetter, R. Six Cases of Subcutaneous Fracture of the Olecranon Cured by Hulsmann's Method. Deutsche Ztschr. f. Chir., 1920, CLX, p. 281.

Kolliker, T. Frost-bite of Both Lower Legs. Zentralblatt für Chirurgie, Leipzig, April 23, 1921, 48, No. 16, p. 563.

Koltonski, H. Osteomalacia. Monatsschrift f. Geb. u. Gynakologie, Berlin, Oct., 1920, 52, No. 4, p. 253.

Lange, F. The Implantation of Foreign Bodies in Orthopedic Surgery. Jahrest. f. Aerztl. Fortbild., 1920, XI, p. 47.

Ledoux, E., and G. Caillods. Sacralization of the Fifth Lumbar Vertebra. Presse med., Paris, 1921, XXXIX, p. 123.

Lemperg, F. Induced Ankylosis of Knee. Zentralblatt für Chirurgie, Leipzig, April 9, 1921, 48, No. 14, p. 486.

Levy, W. Luxation of Tendons of Extensor Digitorum. Zentralblatt für Chirurgie, Leipzig, April 9, 1921, 48, No. 14, p. 482.

Lewis, Dean. Nerve Injuries Due to Errors in Technic in Making Intravenous Arsphenamin Injections. J. A. M. A., June 18, 1921, Vol. 76, No. 25, p. 1726.

Lorenz, A. The So-Called Congenital Dislocation of the Hip; Its Pathology and Treatment. Stuttgart: Enke, 1920.

Marshall, G. D. Diagnosis and Treatment of Diseases and Injuries of Spine. Indiana State Med. Assn. J., March 15, 1921, 14, No. 3, p. 69.

Martin, J. W. The Special Significance of the After Treatment of Bone and Joint Injuries. Med. Herald, 1921, X, p. 46.

Maynard, H. H., and C. R. Scott. Hereditary Multiple Cartilaginous Exostoses. J. A. M. A., 1921, LXXVI, p. 579.

Meyer-Bisch. Treatment of Chronic Arthritis with Sulphur. Münchener Medizinische Wochenschrift, Munich, April 29, 1921, 68, No. 17, p. 516.

Milligan, E. T. C., and R. E. Ford. Fracture of the First Rib. Brit. M. J., 1921, 1, p. 191.

Moreau, L. Fracture of the Scapula. J. de Radiologie et d'Electrologie, Paris, March, 1921, 5, No. 3, p. 121.

Morehead, John L. Traumatic Surgery Problems. J. A. M. A., June 11, 1921, Vol. 76, No. 24, p. 1642.

Muller, G. P. Multilocular Cyst (adamantinoma) of the Lower Jaw Treated by Simple Excision and Followed by Cure for a Period of Three Years. Surg. Clin., North Am., 1921, 1, p. 255.

Enchondroma of the Scapula and Long Bones (Multiple Cartilaginous Exostoses.) Surg. Clin., North Am., 1921, 1, p. 249.

Nobel, E. The Scurvy Question. Zeitschrift für Kinderheilkunde, Berlin. April 4, 1921, 28, No. 5-6, p. 348.

Nobili, U. Treatment of Varicose Veins in Leg. Policlinico, Rone, May 2, 1921, 28, No. 18, p. 149.

Nussbaum, A. The Correction of Severe Scoliosis by the Use of a Removable Plaster Corset. Ztschr. j. Orthop., Chir., 1920, XL., p. 258.

Nutt, J. J. Rupture of Tendon of Insertion of the Biceps Flexor Cubite. J. of A. M. A., June 25, 1921, Vol. 76, No. 26, p. 1825.

Nyrop, E. Treatment of Flat Foot. Ugeschrift for Laeger, Copenhagen, March 17, 1921, 83, No. 11, p. 373.

Osnoto, Michael. Non-operative Treatment of Fractures of Cervical Vertebrae with Cord Injury; the Result in Four Cases. J. A. M. A., June 18, 1921, Vol. 76, No. 25, p. 1737.

Pavlovsky, Alejandro. Edema of the Arm. Semana Medica, Buenos Aires, March 17, 1921, 28, No. 11, p. 317.

Potherat. Fracture of Neck of Femur. Progres Med., Paris, April 2, 1921, 36, No. 14, p. 149.

Pugh, W. T. G. Spinal Caries in Children. A Method of Fixation. Lancet, London, May 21, 1921, 1, No. 5099, p. 1071.

Pulvirenti, S. A Case of Acute Purulent Lumbar Spondylitis. Policlin., Roma, 1921, XXVIII, sez. Chir., p. 27.

Putti, V. Treatment of Fractures of Long Bones. Lyon Chirurgical Lyons, March-April, 1921, 18, No. 2, p. 133.

Rice, L. Case of Progressive Muscular Dystrophy. Texas State J. of Med., May, 1921, 17, No. 1, p. 26.

Ritter, C. Multiple Myelomata. Arch. f. Path. Anat., 1920, CCXXIX, p. 277.

Robertson, D. E. Non-Union Following Fracture. Canadian Med. Assn. J., Toronto, May, 1921, 11, No. 5, p. 343.

Rocher, H. L. and Lasserre. Edema of Leg Without Auto Drainage. J. de Med. de Bordeaux, April 25, 1921, 92, No. 8, p. 216.

Rogers, L. Dislocation of Radius Foreward at Inferior Radio-Ulnar Joint. Brit. Med. J., London, April 30, 1921, 1, No. 3148, p. 639.

Romich, S. Static and Dynamic Deformaties of the Legs. Ztschr. j. Orthop. Chir., 1920, XL, p. 230.

Roth, P. B. Fracture of the Right Semilunar Bone. Proc. Roy. Soc., Med., London, 1921, XIV, Sect. Surg., p. 55.

Rutherfurd H. Downward Dislocation of Patella. Brit. J. of Surg., April, 1921, 8, No. 32, p. 524.

Salomon, A. The Avoidance of Pain and Sensory Disturbances After Amputations. Deutsche Med. Wchnschr., 1920, XLVI, p. 1390.

Scheiber, V. The Operative Treatment of Flail Joint. Orvosi hetil, 1920, LXIV, p. 425-437.

Schlesinger, G., and K. Meyer. Utilizing the Strength of the Muscles of the Amputated Arm. Ztschr. f. Orthop., Chir., 1920, XL, p. 335.

Schuessler, O. Gaugele's "Crossed Atrophy" After Injuries of the Spinal Column. Zetschr. f. Orthop. Chir., 1920, XL, p. 205.

Sheen, A. W. A Case of Fibrous Union of the Femur. Proc. Roy. Soc. Med., London, 1921, XIV, Sect. Surg., p. 59.

Smith, J. F., and M. L. Jones. Results in Open Treatment of Fractures. Ill. Med. J., May, 1921, 39, No. 5, p. 424.

Smith, S. Alwyn. Fractures Occurring in Bone Grafts. J. of Orthop. Surg., June, 1921, Vol. 3, No. 6, p. 270.

Sorrel, E. Six Cases of Osteochondritis Deformas Juvenalis of the Upper Femoral Epiphysis. Rev. d' orthop., 1921, XXVIII, p. 31.

Speed, K. Analysis of the Results of Treatment of Fractures of the Femoral Diaphysis in Children Under Twelve Years of Age. Surg., Gynec. and Obstet., June, 1921, Vol. XXXII, No. 6, p. 527.

Steward, F. J. Acute Infective Arthritis. Brit. Med. J., May 21, 1921, 1, No. 3151, p. 727.

Steinmann, F. Fractures of the Diaphysis of the Lower Extremity. Schweiz. Rundschau J. Med., 1920, XX, pp. 875-916.

Stewart, J. P. A Clinical Lecture on Muscle Tonus, Tonic Rigidity and Tonic Fits. Brit. M. J., 1921, 1, p. 217.

Stoney, R. Atkinson. Modern Surgery of the Elbow. Med. Press, 1921, N. S. CXI, p. 88.

Turtle, G., de B. A Case of Injury to the Right Elbow. Proc. Roy. Soc. Med., London, 1921, XIV, Clin, Sect., p. 22.

Veau, V. ,and C. Ruppe. Correction of Unilateral Harelip. Presse Med., Paris, April 23, 1921, 29, No. 33, p. 321.

Wehner, G. Treatment of Rachitic Bone Curvatures. Munchener Medizinishce Wochenschrift, Munich, April 1, 1921, 68, No. 13, p. 486.

Whitman, A. The Whitman Operation as Applied to Various Types of Paralytic Deformities of the Foot; Results in the Average Case. Med. Rec., 1921, XCIX, p. 304.

Whitman, R. The Reconstruction Operation for Ununited Fracture of the Neck of the Femur. Surg., Gynec. Obstet., June, 1921, Vol. XXXII, No. 6, p. 479.

Wittenrood, A. C. Treatment of Sciatica. Nederlandsch Tijdschrift V. Geneeskunde, Amsterdam, March 12, 1921, 1, No. 11, p. 1403.

Current Orthopaedic Literature

DISLOCATION OF THE SACRO-ILIAC JOINT. By Alexander Gibson, M. A., M. B., Ch. B F. R. C. S., (Eng) F. R. S. E., Winnipeg, Manitoba. *Jour. A. M. A.*, Vol. 76, No. 22, May 28, 1921.

The sacro-iliac ligaments are so strong that it hardly seems possible that dislocation of the joint could occur; it would seem much more likely that violence sufficient to cause rupture of those ligaments would lead to rupture of the pelvis in preference, and in most cases would cause death. In cases of this injury which have been placed on record, the majority have been fatal or have been accompanied by fracture of the pelvis. Dislocation of the sacro-iliac joint has also been noted as a complication of diastasis at the symphysis pubis.

CASE REPORT

An eight year old boy was hit by an express train in such a manner that the sacrum seemed driven forward of the left ilium without a fracture. Eighteen days following the injury the patient has recovered sufficiently to permit operation. A posterior curved incision was made, projecting portion of ilium removed with an electric saw, this portion wedged in as a graft between the sacrum and ilium. Recumbency in bed for two months wearing a pelvic binder. There was practically complete recovery.—*Leo C. Donnelly, Detroit.*

NONOPERATIVE TREATMENT OF FRACTURES OF CERVICAL VERTEBRAE WITH CORD INJURY. THE RESULT IN FOUR CASES. Michael Osnato, M. D., New York. *Jour. A. M. A.*, Vol. 76, No. 25, June 18, 1920.

Operative interference in a complete transverse crushing of the cord is useless and frequently harmful, but an operation may be urgently necessary if there is no complete transverse lesion. The difficulty is to determine whether there is a transverse crush or whether the symptoms are due to concussion of the cord or to an acute edema of the cord tissue.

There are undoubted cases on record in which some of the reflexes were preserved or where some of the reflexes returned in spite of the presence of complete lesion. In the majority of instances a complete motor paralysis and loss of sensation below the level of the injury with loss of all cutaneous and tendon reflexes and paralysis of the bladder and rectum, point to a spinal cord injury so serious that immediate operative interference is contraindicated. If the symptoms are due to spinal concussion in which considerable lengths of the cord are affected, a local operation will do little if any good, and it may do much harm.

If the symptoms are due to an incomplete crush or to compression of the cord, there will surely be some improvement within the first few days; then operative interference will offer much better chances of success.

When some motor, sensory or reflex power remains immediately after the trauma, and a complete motor and sensory paralysis later supervenes, operative interference should not be delayed, especially if compression of the cord by dislocated or fractured bone or by blood has been demonstrated.

After the decision to interfere surgically is arrived at one then immediately subjects his patient to the dangers of operation on the cervical cord, which are chiefly liable to cause edema and consequent interference with the functions of the vagus and phrenic nerves, namely respiratory and cardiac paralysis. Good functional recoveries occur most often after cervical injuries, as against injuries to other levels of the cord. The most frequent residuals are pareses in the extremities and atrophies in the small muscles of the hand, with stiffness in one or both of the lower limbs.

The loss of sensation accompanying such injuries often leaves only a scant residual disturbance. Root pains seem to be limited to one upper extremity.

Four cases are reported with undoubted cord injuries. From the neurologic findings the first case was probably a complete crush of the cervical cord, and resulted, as all these cases do, in death within a few months after injury. The other three cases were examples of partial involvement of the cervical cord, and all three of the patients recovered without operation.—*Leo C. Donnelly, Detroit.*

THE ROLE OF CANCELLOUS TISSUE IN HEALING BONE. T. Wingate Todd, F. R. C. S. (Eng.) *Ann. Surg.* 1920. Vol. 72, pp 453-466.

The paper contains a digest of observations made on about two hundred cases of chronic osteomyelitis, the result of wounds, in the Base Hospital Wolseley Barracks, London, Ont., in 1918. Most of these cases presented cavities in the long bones and therefore gave an excellent opportunity of studying the relation of cancellous tissue (or medulla) to healing bone without the complication of periosteal involvement. Various technical problems relating to effective treatment of such cases are dealt with in the body of the paper. The author's results regarding cancellous tissue are summarized in the following manner.

1. Cancellous tissue is one of the chief agents in regeneration of bone, and like the cambium layer of periosteum, should be treated at operation in the most conservative manner, consistent with thorough exploration and drainage.

2. In regeneration the cancellous tissue nearest the mid length of the bone grows most rapidly, whereas that in or near the articular extremities shows less readiness to proliferate and fill the cavity.

3. Septic bone cavities should be permitted to heal from the bottom, the wound in the soft tissues being kept widely open until this has occurred. The least possible mechanical disturbance of the cancellous tissue should be employed and no "disinfection" of the cavity attempted, for this simply kills the remaining tissue from which regeneration is expected.

4. Regenerating bone is very sensitive to and easily affected by pressure,

even of soft tissues, and by inefficient drainage. It is not adversely affected by the ambulatory method of treatment.

The work results practically in a restatement of principles laid down by Ollier but lest the reader's mind be diverted from the real significance of the paper, reference to the famous Duhamel-Haller controversy in any of its phases is avoided. In this case the work was carried out entirely upon man. Ollier's experiments were upon animals. Here one finds confirmation for man of Ollier's observations upon the osteogenetic power of the "marrow" in dogs. Again one finds the tube experiment of Ollier on the rabbit tibia reproduced and followed up in the long bones of Man. The essential lession of the work is that cancellous growth, though considerable, is delicate but that with proper care it can be encouraged and the cavity filled in a reasonable time with new bone after which, and not before, the soft tissues may be allowed to close.

NERVE SUTURE. Edwin M. Miller. *Archives of Surgery*, Jan., 1921. An experimental study to determine the strength of the suture line.

In the repair of peripheral nerve injuries it often becomes necessary to resect an extensive scar in order to reach healthy funiculi and considerable tension may be required to procure an end to end suture. The object of this experimental study was to determine the strength of the suture line at different periods after the anastomosis and to find out the relation between the size of a nerve and its tensile strength at the suture line. The sciatic nerve of dogs was used and two series of animals were run. In the *first*, sonsisting of eleven animals, a section of the sciatic was removed sufficiently long to require complete flexion of the leg on the thigh before end to end suture could be made. Some of the animals were allowed to use the limb as soon as desired. In others a plaster dressing was applied for different periods of time, varying from 11 days to 24 days. Study of these suture lines after autopsy showed a separation at the site of operation in only one instance. In the *second* series, consisting of eleven animals, end to end suture was made on the two main branches of the sciatic in the right leg and on the entire sciatic in the left leg, the diameters of those nerves varying approximately as 1:3:5. Determinations were then made of the strength of the suture lines at different periods after operation (from 1 week to 5 weeks) by the application of weights to a cord connected with the distal segment.

CONCLUSIONS

(1) In dogs, which show individual differences in rapidity of repair as do humans, the tensile strength of a suture line in the sciatic nerve or its branches is practically as great at the end of the third week as at the end of the 4th or 5th week.

(2) The strength of the suture line, especially after the 2nd week, is almost directly proportional to the diameter of the nerve.

(3) The epineural sutures of fine catgut or silk play little if any part in the strength of the suture line after the second week.

(4) Practical application. Long defects of nerves may be overcome by mobilization of the segments and change of posture with end to end suture. The suture line is apparently firm enough after three weeks to begin gradual straightening of the flexed forearm or leg. Clinically after operation upon the sciatic nerve, it would seem best to wait six or eight weeks after suture before extending the leg if flexion has been necessary to complete an end to end suture. In case of the median and ulnar extension of the forearm should not be attempted until after four weeks if flexion has been required.—*E. M. Miller.*

THE FALSE LOCALIZING SIGNS OF SPINAL CORD TUMOR. By Charles A. Elsberg, M. D., New York City. *Archives of Neurology and Psychiatry*, 1921, Vol. 5, page 64.

The author reports several cases of spinal cord tumors in which the level signs vary at different periods. He calls attention to the frequency with which patients with spinal tumors in the cervical region first complained of sensory and motor symptoms referable to the lower extremities, and states his belief that the fibers for the different extremities and perhaps even for parts of extremities are grouped together in the spinal pathways. Errors in interpretation of the signs referable to the side and part of the cord affected are possible, and the writer mentions explanations for these errors. Finally, the author discusses the explanation of paresthesia in the upper extremities caused by tumors in the thoracic cord and voices the belief that the upper extremity symptoms may be due to the effects of a column of cerebrospinal fluid above the tumor.

EPICONDYLITIS HUMERI. Louis Carp. *Surg., Gynec., and Obst.*, March, 1921.

Epicondylitis Humeri is a condition found in those engaged in heavy manual labor characterized by pain in the elbow region, functional impairment to a greater or lesser degree, persistent tenderness limited to the epicondyle of the humerus and extreme weakness of the forearm. Lifting with the hand in supination is possible with great difficulty, but almost impossible with the hand in pronation. There is no atrophy. X-ray examination shows no definite or constant changes. The average duration is about six weeks, but the condition may last several months with periods of intermission or remission. The symptoms may disappear gradually or suddenly. The etiology is doubtful. Influenza, strain, neuralgia, and trauma are possible etiological factors. An analogous syndrome may occur in the styloid process of the radius and the condyle of the femur. The best therapy seems to be immobilization and baking.—*Louis Carp.*

TREATMENT OF TUBERCULOSIS OF THE KNEE JOINT. By J. J. Kurlander, M. D. *Ohio State Medical Journal* January 1921.

Knee joint tuberculosis constitutes about 20 to 25 per cent of all cases of joint tuberculosis.

The disease may be primary either in the synovia or in the bone. Shaft tuberculosis is rare.

Knee joint tuberculosis must be differentiated from chronic synovities due to sprains, trauma or infection. Also from syphilitic joint affections, Sarcoma, carcinoma, etc.

In children there is a more marked resistance to the disease and reparative processes is much more active in children than in adults. For this reason, in children conservative treatment such as rest and immobilization are indicated.

Operative procedure hastens and insures a cure and is therefore indicated in adults.

The operation is that of resection of the knee. The author follows the technic of R. H. Hibbs in that only the cartilages of the articulating surfaces of the femur and tibia are removed. There is no attempt to excise or remove the capsule. The patella is excised sub-periostially and placed in a bed chiselled out in the femur and tibia, thus both immobilizing the bones and acting as a bone graft in one.

Immobilization in a plaster cast for three months at which time firm union is to be expected.—*J. J. Kurlander, M. D.*

DERANGEMENT OF THE SEMI-LUNAR CARTILAGE. Louis Strahlmann, M. D., and J. W. White, M. D. *Journal of the A. M. A.*, February 26, 1921.

The authors analyze seventy-six operative cases of Semi-lunar Cartilage Derangements from the viewpoint of history, physical findings, surgical pathology, and end results.

In diagnosis, the localized pain and tenderness are particularly stressed, being present in the vast majority of cases, while locking is present in only about one-half of the cases. They believe simple hypermobile cartilage is a definite entity, more common than actual fracture of the cartilage, and that the external cartilage is involved in about one-fifth of the cases. Complete excision is considered the operation of choice and an early operative interference is advised. Careful analysis of end results in the unrelieved cases, (14%), shows that most untoward results are due to undetected syphilitic and tuberculous lesions, the deranged cartilage being only secondary. Results are also influenced by the involvement of other joint structures in the original trauma, the duration of the lesion, and the extent to which the cartilage has been excised.

BILATERAL FORWARD DISLOCATION OF THE FIFTH CERVICAL VERTEBRAE WITH REDUCTION BY MANIPULATION. By Mitchell Langworthy, Spokane, Washington. *Journal of the American Medical Association*, February 12, 1921, Vol. 76, pp 447 and 448.

August 5th, 1920, a truck driver aged twenty-eight sustained an injury which forced his neck into extreme flexion. He was unconscious for a few minutes while being moved. Respiration was difficult and this was improved by traction on neck. Priapism, numbness and tingling in right hand and forearm and over entire left lower limb, frequent coughing with fresh blood

in sputum, and pain in neck, were the only symptoms. Lateral roentgenograms showed a bilateral forward dislocation of the fifth cervical vertebra on the sixth with a slight impaction of the body of the fifth. The fifth lay at least one-half inch anterior to the sixth. Reduction by manipulation was accomplished under anaesthesia five and a half hours after the injury, the roentgenogram showing perfect alignment. The method of Walton was followed which attempts to slip the articular facet, first of one side and then of the other back into position on the facets of the vertebra below. The neck and head were supported in plaster for six weeks. The symptoms gradually disappeared. He was up on the seventh day and discharged from the hospital on the fourteenth day, walking well with no discomfort. Examination at the end of the tenth week showed him to be perfectly well except for a slight soreness and stiffness at base of neck due probably to laceration of the ligamentum nuchae and the trapezius muscles. Movements of the neck were normal in extent although somewhat weak.—*Abstract by the Author.*

METHODS TO SECURE END-TO-END SUTURE OF PERIPHERAL NERVES. By Howard C. Naffziger, M. D. San Francisco. Department of Surgery, University of California Medical School. Abstract by the author.

End to end suture of peripheral nerves is the aim of the surgeon in those cases of nerve division which come to operation. When this is impossible "auto cable" grafts offer the next best prospect. In lesions of the large nerve trunks—ulnor, median, musculo spiral, the great sciatic and its internal and external popliteal divisions it is rare that end to end suture can not be obtained.

Of the methods found most useful in obtaining apposition of the divided nerve ends are:

1. Free mobilization of the proximal and distal portions of the nerve obtained by long incisions, identification of normal nerve above and below the point of injury, free dissection of nerve from sheath and when necessary lengthening of nerves to muscles by dissecting them from the main nerve trunk. This does not interefere with their function.

2. Transposition of the nerve to a shorter route than the normal one.

(a) Ulnar nerve—Transposition from behind the internal condyle to the flexor surface beneath the deep fascia and pronator radii teres without sacrifice of branches to the long ulnar flexors. Free the nerve well above the point of penetration of the internal inter muscular septum.

(b) Musculo-spiral nerve. Transposition to a position beneath the biceps and on the anterior surface of the humerus is used in extensive injuries to the posterior surface of the arm as well as to aid in overcoming nerve gaps. A high internal axillary incision and an incision on the outer surface of the lower third of the arm are used. The branches to the outer head of the triceps are sacrificed by this procedure.

(c) Median nerve—Dissection upward of the muscular branches and transposition to a more superficial position.

3. Favorable posture of the extremity to shorten the distance to be over come.

Ulnar—by flexion of wrist and elbow. Adduction and a forward position of the arm.

Musculo spiral—flexion at elbow, adduction and forward position of the arm with internal rotation.

Median—Wrist and elbow flexion. Adduction of arm.

Sciatic nerve—Extension of hip, slight abduction, full flexion of knee.

A method of exposing the entire sciatic by reflection of the gluteus maximus and permitting suture within the sciatic notch is given.

4. Gradual lengthening of the nerve by a two stage operation.

At the first operation by mobilization, transposition and favoring posture as much of the involved portion of the nerve as possible is resected and the ends sutured together. The extremity is gradually straightened over a period of about two months when a second stage operation permits resection of the remaining scar and end to end suture.

Interrupted fine silk sutures including only the neurilemma are used with no through and through sutures. Attempt is made to avoid rotation of the nerve by matching the intrinsic vessels of the nerves. Ringers solution and cotton sponges for freeing the nerve of clots are used. No foreign material or auto grafts of tissue are used to protect the suture line. An attempt is made to have it lie between muscle planes.

After treatment. Removable splints are used to maintain desired postures with gradual extension of joints. One or two months are allowed for lengthening the nerve. During this time massage and joint movements within the permissable range are practiced.

Length of nerve gaps overcome.

For the ulnar nerve by a combination of all methods outlined—10 cm.

For the musculo spiral nerve 10 cm; median 9 cm. Sciatic and its two main divisions each 10 cm.

Larger gaps may be overcome by two stage operations. By the adoption of these methods nerve grafts are rarely necessary.